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THE
HAPPY CAMP - LAVA BEDS
WESTERN PINE BEETLE EPIDEMIC INFESTATION
ON
PRIVATE AND GOVERNMENT YELLOW PINE
IN
MODOC COUNTY, CALIFORNIA.

BUREAU OF ENTOMOLOGY
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THE SITUATION IN BRIEF

During the fall of 1922 a pine beetle infestation of unknown proportions in the yellow pine in the Lava Beds section of the Modoc National Forest was reported by Forest Service officers. The writer had the opportunity to go over the situation in November, 1922 in a preliminary way.

The pine beetle infestation was found to be in an epidemic condition on a considerable part of the 430,000 acres of yellow pine timber designated on the map attached to this report. About 145,000 acres of this timber are in private ownership, and the remaining 285,000 acres are within the Modoc National Forest. It is estimated that at least five billion feet of yellow pine is contained within these 430,000 acres. During 1920, 1921 and 1922, the western pine beetle has been taking an enormous and an increasing toll of the thrifty, sound, merchantable timber.

The beetle which is causing this death of large volumes of timber in what may be called the Happy Camp-Lava Beds of the Modoc Forest, is the same one against which the private owners and the Federal Government are cooperatively directing control measures in Southern Oregon and Northern California. On the million acres of yellow pine timber within this control project, there is an estimated stand of twelve billion feet of yellow pine. The fact that within the past ten years the western pine

beetle has killed at least ten per cent, or over one billion feet of pine timber, is abundant evidence of the destructiveness of the beetle. With the technical advice of the federal Bureau of Entomology, those responsible for the protection of private and government timber have already made a successful start in checking the further destructive activity of the beetle within the project boundaries.

Whether the epidemic infestation now in progress on the infested area which is the subject of this report, will prove to be as destructive as the one which is engaging the serious attention of private and government agencies in Southern Oregon cannot be predicted. However, during 1920, 1921 and 1922 there has been a three-year loss amounting to at least 100,000,000 board feet or a loss of two per cent of the estimated yellow pine timber on the area in question. There are other species of timber on the area but no appreciable volume of these species are being successfully attacked by insects. Next to yellow pine, sugar pine is the most important commercial tree in the area. Sugar pine is susceptible to the attacks of the mountain pine beetle, a beetle closely related to the western pine beetle, but at present the sugar pine is fairly free from mountain pine beetle damage.

The pine beetle problem here described should have the immediate attention of the Forest Service and the

private owners. Whether or not control measures are needed in the very near future is properly a matter for decision only after further field work has been done both by the Bureau of Entomology and those directly responsible for the protection of the private and government timber. Whatever action is taken must be shared in cooperatively by both the Federal Government and the private owners because of the close intermixture of Federal and private timber on this area.

RESOURCES AND OWNERSHIPS INVOLVED

Within the heavy red line drawn on the attached map there are at least 430,000 acres of yellow pine. The stands fall into two rather distinct classes from the standpoint of volume and quality. About 230,000 acres contain from 2 to 10 M. board feet per acre within an average volume of perhaps 7 M. board feet per acre, or a total stand of somewhat more than 1,600,000 M. board feet. This timber is rather short and scrubby and of but fair merchantability. The second class of yellow pine lands has an area of 200,000 acres and is conservatively estimated to run from 11 to 35 M. board feet per acre with an average of 17 M. board feet per acre, or a total stand of 3,400,000 M. board feet. This second class of lands contains clean-boled pine of high merchantability.

Two hundred eighty-five thousand acres, or over 60 per cent, of the timbered area are within the Modoc National Forest. The remaining 40 per cent, or 145,000 acres, are in private ownership and contain a considerable proportion of the best timber. Over 75 per cent of the privately owned area is divided into two ownerships while the remaining 25 per cent is distributed among perhaps 80 ownerships. This divided ownership situation makes complete cooperation necessary for the effective execution of any pine beetle protection program which may be adopted.

An outstanding characteristic of this large area is its topography. Practically all of it is level and distinct drainage lines are almost absent. There is practically no underbrush and a large part of the area is devoid of surface rock. All sections of the area are, therefore, easily accessible except the high ridges which mark some of its boundaries. In the event of control measures, perhaps the most serious obstacle is the lack of living streams and the complete dependence which must, therefore, be placed on widely distributed water holes in the lava rock for camp purposes.

The body of timber under consideration is partially separated and interspersed by considerable areas of juniper, sagebrush and grassland. On the north the timber is bounded by a big expanse of sagebrush and treeless areas, on the east by juniper and by yellow pine seemingly unaffected at present by the western pine beetle, on the south by juniper and by yellow pine fairly free of pine beetle attacks, and on the west by a barrier of mixed firs and pines in which insect attacks are relatively infrequent and by pine stands of which the majority are not at present suffering from beetle depredations. The 430,000 acres included in the Happy Camp-Lava Beds infestation do not, therefore, comprise a complete or even a part of a distinct topographic unit. Beginning at the northwestern extremity of the infested zone, the northern

boundary is marked roughly by the Ice Caves, Timber Mountain, Lone Pine Butte and Moivitz Butte. The chief topographic features of the eastern boundary are Lost Valley, Duncan Reservoir and Scheffer Mountain. The southern extremity divides Stone Coal Valley, includes Crank Spring, Widow Valley and Little Hot Spring Valley. The western limits of this infestation are marked by White Horse Reservoir, Buck Butte and Glass Mountain.

It is confidently expected that detailed field work supplementary to this cursory examination will result in revising the boundaries to conform more exactly to the limits of the epidemic beetle attacks and to the topographic and timber type barriers.

THE EXISTING WESTERN PINE BEETLE INFESTATION

The western pine beetle (*Dendroctonus brevicomis*) is distributed throughout the yellow pine forests of Oregon and California. Year after year these beetles kill healthy, vigorous yellow pine, and they attack no other species of trees. When the beetles kill a few scattered trees annually, 10 to 15 trees per section for example, the infestation is known as a normal infestation. Because of the influence of natural factors, the beetles are under ordinary conditions confined to this normal damage. Control measures are not directed against this type of beetle depredations. Occasionally, due to various causes, the beetles multiply rapidly and within a few years kill greatly increased volumes of timber. At such times, the infestations are said to be epidemic infestations. These severe losses may continue uninterruptedly for several years or they may cease for a year or so and then be renewed with even greater severity. Under all circumstances, the prompt inauguration of control measures results, not only in a saving of timber, but in economy in the cost of putting the impending epidemic under control. And when such an epidemic has been averted or checked, the once threatened timber should be kept under constant surveillance in order to prevent the recurrence of expensive beetle epidemics. The prompt detection of dangerous pine

beetle activity makes effective control possible at a decidedly less expense than is the case when attempts are made to reduce the beetles after they have been unmolested for several years intheir epidemic activity.

As has already been indicated, not enough field work has been done on the infestation under discussion to make definite recommendations as to the feasibility or desirability of control measures. What procedure is desirable from the entomological standpoint is a matter for final decision by representatives of the Bureau of Entomology.

The existing infestation represents a steady but quite rapid increase over the beetles activity in 1920. Whether the present severity of damage will be maintained for several years, or whether further substantial increases are immiment can not be predicted. In 1920, the yellow pine killed by the western pine beetle varied from 20 to 50 trees per section or from 10 M. to 35 M. board feet per section and an average of 25 M. per section. In 1921, the pure yellow pine stands suffered a loss of from 30 to as many as 200 trees per section with an average of perhaps 50 M. board feet per section. In November, 1922 it was not possible to estimate the 1922 loss because many of the infested trees still had their normal green foliage but the evidence indicated at least a one-third increase over the 1921 losses or an average loss of perhaps 70

M. board feet per section. In other words, during the three years, 1920, 1921 and 1922, there occurred a killing of yellow pine which averaged 150 M. board feet of yellow pine per section for the 430,000 acres of timber included in the boundaries as drawn on the attached map.

The volume of the average tree killed during the three years is about 700 board feet. Thus during the three-year period, 1920-1922 inclusive, a total of over 200 trees per section were killed by the western pine beetle.

Many of the trees killed during the past two years occur as groups, a condition which indicates that natural agencies can not be depended upon to control the situation for some time to come.

In several places within the area, small fires have occurred since 1919. In some cases, these fires have been followed by heavy concentration of pine beetle activity. Approximately 18,000 acres of timber were burned over in the southwest portion of the area in August, 1920 by what is now known as the White Horse fire. On this burn, pine beetle activity does not seem to be greater or less at present than in the adjoining non-burned areas.

Along the western boundary of the area, yellow pine occurs in mixture with sugar pine, Shasta red fir and other species. Often the yellow pine in these mixed stands is of extremely high quality and fortunate it is indeed that in such stands the western pine beetle is not dangerously active.

A MENACE TO THE ANTELOPE PROJECT

Probably the most severe infestation on the area is concentrated in the northwest corner in the vicinity of the Ice Caves and northwest, north and northeast of Mt. Hoffman. As far as is now known, this heavy infestation may extend westward to the general vicinity of the Antelope pine beetle control project now being carried on by the Weed Lumber Company with the advice of the Bureau of Entomology and with considerable success. Whether this infestation is a menace to the Antelope project is a matter which should be determined promptly by a detailed investigation.

THE RECOMMENDED ACTION

The data presented in this report were secured as the result of about one week in the field. They are, therefore, necessarily preliminary and hardly more than approximate in character. The examination was sufficient to thoroughly convince the writer that the following action is highly desirable:

1. Detailed study of the situation next field season to definitely determine the boundaries of the existing epidemic infestation, to accurately ascertain the trend of the infestation and to secure data on which conclusions regarding the feasibility, character and cost of control measures can be safely based.

2. The establishment of cooperative relations between the Federal Government and the private owners which will permit concerted action if control measures and the carrying out of a permanent plan of protection against the beetles are found necessary. No protection plan will be effective unless all the ownerships have a share in its execution.

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
W. B. GREELEY, FORESTER

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LEGEND

Boundary of Happy Camp Epidemic Infestation.

Infested Zone Connecting Antelope Project of Weed Lumber Company with Happy Camp Infestation.

December, 1922.

A. J. Jaenicke,
Forest Service,